

CORNELIUS O'SULLIVAN, F.R.S.

THE death of Mr. Cornelius O'Sullivan, F.R.S., which took place on January 8, at the age of sixty-five, has removed from amongst us a worker of great originality who, during the past thirty-five years, made his mark in various branches of pure and applied chemistry connected more or less directly with the industrial processes of brewing.

A native of Bandon, co. Cork, O'Sullivan developed a taste for science at a very early age, and having obtained a scholarship at the Royal School of Mines went through the three years' course with distinction, and became attached to the teaching staff of the Royal College of Chemistry, then in its old quarters in Oxford Street. In 1866 he became private assistant to Prof. A. W. von Hofmann, whom he accompanied to Berlin in that year. In the following year he entered the business of Messrs. Bass and Co. at Burton-on-Trent, where he ultimately became the head of the brewing and scientific staff, a post which he occupied up to the time of his death.

When O'Sullivan entered the brewing business the new ideas and discoveries of Pasteur with regard to fermentation were beginning to exercise a marked influence on brewing practice, and there seemed some danger of the new science of bacteriology occupying the field to the exclusion of chemistry. It is the special merit of O'Sullivan that, although very receptive of these new ideas, he clearly recognised that all the biological problems with which the brewer has to deal must ultimately be referred to the chemist, and he therefore set to work, in the first instance, to investigate the nature of starch and the mode in which it is transformed under the hydrolytic agencies of diastase and acids. In these researches O'Sullivan made use of the polarimeter, and by a combination of the optical method with that of cupric reduction he elaborated processes for a study of the gradual disintegration of the starch molecule which have been employed by all subsequent workers. In following the course of the action of diastase on starch, he conclusively proved that the sugar which is formed is not, as was then generally believed, glucose, but a well-defined crystallisable biose, maltose, and that the dextrans which are simultaneously formed consist of several bodies differing amongst themselves by certain well-marked properties. His researches on the influence of temperature on the reaction led to certain valuable practical applications, with which every student of brewing technology is now familiar. The results of O'Sullivan's work on starch were published in the *Journal of the Chemical Society* between 1872 and 1879, and constitute a series of memoirs which are justly regarded as classical.

O'Sullivan then turned his attention to the amylans and other carbohydrates of the cereals, and also extended his researches to the gums of the arabin series and to gum tragacanth. Throughout the middle and later period of his life he studied the action of the enzyme invertase on cane-sugar, and in a remarkable memoir published on this subject, in collaboration with Tompson, there is a vast amount of information which seems destined some day to assist in finding a rational explanation of the mechanics of enzyme action.

In 1884 the Chemical Society marked its appreciation of O'Sullivan's work by awarding him the Longstaff medal, and in the following year he was elected a Fellow of the Royal Society.

The varied life-work of O'Sullivan affords an excellent example of the brilliant results which can be attained by the close union of pure science and technology, and of the constant reaction of one on the

other. Of all our industries there is not one, with the possible exception of agriculture, which is able to suggest so many problems in chemistry, physics, and biology as the ancient industry of brewing, and no one understood this better than the subject of this brief notice. Of his fine personal qualities and of the influence he had on the younger workers in a field which he made specially his own this is not the place to speak; suffice it to say that his generous, warm-hearted Celtic nature endeared him to a large circle of friends who are now mourning his loss.

NOTES.

THE council of the Royal Astronomical Society has awarded the gold medal of the society to Prof. E. W. Brown, F.R.S., professor of applied mathematics at Haverford College, Pennsylvania, U.S.A., for his researches in the lunar theory.

THE Göttingen Königliche Gesellschaft der Wissenschaften has elected the following foreign members:—Prof. H. A. Lorentz, Leyden; Prof. L. Luciani, Rome; Lord Rayleigh, Pres.R.S., and Prof. C. S. Sherrington, F.R.S.

THE council of the Royal Geographical Society has elected Mr. Roosevelt, President of the United States, an honorary member of the society. President Roosevelt has intimated his acceptance of this distinction.

PROF. E. L. NICHOLS, professor of physics in Cornell University, has been elected president of the American Association for the Advancement of Science for the meeting to be held next year at Chicago.

M. BOUQUET, director of technical instruction to the French Minister of Commerce, has been elected director of the Conservatoire national des Arts et Métiers for a period of eight years from January 1 last, in succession to M. Chandèze, who has retired.

WE learn from the *British Medical Journal* that the French Government has asked the Pasteur Institute to undertake an inquiry as to the distribution of malaria in various centres of colonisation in Tunis, especially the Béja, Mateur, and Goubellat regions, and as to the means of checking the prevalence of the disease.

THE Geological Society of London will this year award its medals and funds as follows:—Wollaston medal to Prof. W. J. Sollas, F.R.S.; Murchison medal to Mr. Alfred Harker, F.R.S.; Lyell medal to Dr. J. F. Whiteaves, of Ottawa; Wollaston fund to Dr. Arthur Vaughan; Murchison fund to Dr. Felix Oswald; Lyell fund to Mr. T. C. Cantrill and Mr. Thomas Sheppard; the Bigsby medal to Mr. A. W. Rogers, of the South African Museum, Cape Town.

NEW YORK UNIVERSITY has received a gift of about fifteen acres of land adjoining the south line of its grounds. The value of the property is, *Science* states, said to be between 40,000*l.* and 60,000*l.* From the same source we learn that Mr. Andrew Carnegie has given to the College of Physicians of Philadelphia 20,000*l.* toward the erection of its new building, on condition that a like sum be subscribed, of which 16,000*l.* has already been received.

WE announce with regret the death of the Very Rev. Robert H. Story, principal of Glasgow University, on January 13. For twenty-seven years Dr. Story was minister of the parish of Roseneath, and in 1886 he was appointed to the professorship of ecclesiastical history in the University of Glasgow. In 1898 he succeeded the Rev. Dr.

Caird as principal of the University. He was mainly instrumental in raising a special fund of nearly 100,000*l.* for improving Glasgow University.

A REUTER message from Samarkand reports that the eclipse of the sun on January 14 was observed from a point at the 1481 verst on the railway between the stations of Kuropatkins and Mijulninskaja. The first sign of the eclipse was noticed shortly after 9 a.m., and at 9.53 the period of total eclipse set in, lasting for two minutes. Throughout the time of observation snow was falling.

In celebration of the twenty-first year of work, the president and council of the Biological Society of Liverpool have invited members of the society and their friends, along with some distinguished biologists from other towns, to a conversazione to be held on Friday, January 25, in the museum and laboratories of zoology in the University of Liverpool. The hon. sec. of the society is Mr. J. A. Clubb, Free Public Museums, Liverpool.

THE *Daily Chronicle* announces that a "zoo" for Yorkshire on an extensive scale has been definitely settled upon. A twenty-seven acres site near Roundhay Park, Leeds, has been selected. Herr Hagenbach, of Germany, is acting for the promoters of the scheme. An ostrich farm is to form a leading feature. A correspondent at Leeds informs us that the City Council, to whom Roundhay Park belongs, is not concerned with this project, which is a private venture for purposes of profit.

A SET of Watson magnetographs has been installed in the new magnetic house at Helwan Observatory, near Cairo, Egypt. The equipment comprises recorders for declination, horizontal intensity, and vertical intensity. The temperature coefficients of the intensity instruments are now being determined, and it is hoped that this work will be completed in February, and regular observations commenced.

THE rules of the *aéroplane* race, which is to take place on July 14, 1908, are published in the *Paris Matin* of January 14. All the machines which start, without distinction of name or of form, but of French make, will be admitted as competitors. Whatever may be the meteorological conditions on the date arranged, they will have to travel from the offices of the *Matin* in Paris to the office of the same journal in London within a maximum period of twenty-four hours, using only their own means of propulsion. The winner of the race will receive a prize of 250,000 francs (10,000*l.*).

EARTHQUAKE shocks were felt in the following places on January 10:—*Christiania*.—Two rather severe shocks of earthquake were felt at 1.30 a.m.; they were accompanied by rumbling sounds. The shocks were felt in towns on both sides of the Christiania Fjord. *Frederikstad*.—A slight shock was felt at 12.15 a.m., a more severe one at 1.30 a.m. *Gothenburg*.—Two severe shocks were felt in the district between Kornsjo and Mellerud at 1.30 a.m. A strong shock was also felt at Strömstad at the same time. *Arvika (Wernmland)*.—A violent shock occurred at 2.25 a.m. *Upsala*.—At 1.33 a.m. the Upsala seismograph recorded a slight shock which lasted twenty seconds. A despatch from Honolulu on January 10 states that the Mauna Loa volcano, Hawaii, is in active eruption.

A REUTER message from Kingston, Jamaica, announces that on January 14 the sixth agricultural conference, under the auspices of the Imperial Department of Agriculture, was opened there by Sir J. A. Swettenham, the Governor.

Sir Daniel Morris delivered the presidential address, which reviewed the work accomplished by the department in developing tropical industries. The attendance at the opening meeting was large, those present including men of science and agriculturists from all parts of the West Indies.

A VIOLENT earthquake occurred at Kingston, Jamaica, at 3.30 on Monday afternoon, January 14, and caused great loss of life and property. No details of the disaster are known at the time of going to press, but it is reported that many houses and other buildings have been destroyed by the earthquake and the fires which started immediately after the shock. A Reuter message from New York states that cable communication with the Bermudas was broken on Monday night. The Commercial Cable Company's lines to the West Indies are also interrupted. The Hamburg-American Line Agency has received a message from Holland Bay, January 15 (5.38 p.m.), stating that a slight earthquake occurred there on Monday, but no damage was done. The seismograph at the offices of the U.S. Weather Bureau, Washington, recorded vibrations beginning at 3h. 38m. 23s. on Monday afternoon. Mr. Metcalf, Secretary for the U.S. Navy, has cabled to Rear-Admiral Evans, commanding the U.S. Fleet off Guantanamo, Cuba, directing him to investigate the extent of the Jamaica disaster and report to the Navy Department. A *Daily Mail* correspondent at Christiania reports that an earthquake was felt on Monday afternoon at Trondhjem and over the greater part of northern Norway. At some places the shock was severe enough to shake the houses.

MR. HALDANE, Secretary of State for War, has approved of the amalgamation of the Army Medical Advisory Board and the Army Hospital and Sanitary Committee. The re-constituted Army Medical Service Advisory Board is composed of the following members:—chairman, the Director-General, Army Medical Service; vice-chairman, the deputy Director-General, Army Medical Service. Members: Lieut.-Colonel D. Bruce, C.B., F.R.S. (as expert in tropical diseases); Colonel G. K. Scott Moncrieff, C.I.E., Assistant Director of Fortifications and Works; Lieut.-Colonel C. H. Melville (as expert in sanitation). Civilian members: Sir F. Treves, Bart., G.C.V.O., C.B.; Dr. J. Rose Bradford, F.R.S., professor of medicine, University College, London; Dr. Louis Parkes, consulting sanitary adviser to H.M. Office of Works; Dr. M. S. Pembrey, lecturer in physiology, Guy's Hospital; Sir Charles A. Cameron, C.B., professor of chemistry and hygiene, Royal College of Surgeons, Ireland. Representative of the India Office: Surgeon-General A. M. Branfoot, C.I.E. Secretary: Lieut.-Colonel C. H. Melville.

THE British Academy has received the sum of 10,000*l.* for the purpose of establishing a memorial to the late Mr. Leopold Schweich, of Paris. In accordance with the wishes of the donor, the endowment is to be called "The Leopold Schweich Fund," and is to be devoted to the furtherance of research in the archæology, art, history, languages, and literature of ancient civilisation, with reference to Biblical study. There are to be annually not fewer than three public lectures—"The Leopold Schweich Lectures"—to be delivered in London, and as the ordinary rule in the English language, dealing with some subject or subjects coming within the scope of these studies. The residue of the income of the fund, with all sums which may hereafter be added thereto by gift, bequest, or otherwise, is to be applied for the purposes of excavation, and for the publication of the results of original research in connection with one or more of the subjects named.

It is with regret that we have seen the announcement of the death of Mr. T. R. Dallmeyer, who was for many years the managing director of the celebrated firm of J. H. Dallmeyer. He was the son of Mr. J. H. Dallmeyer, and grandson of Andrew Ross, and to a worthy degree carried on the work of these pioneer opticians. Mr. Dallmeyer designed several lenses and other photographic apparatus, but is best known as the inventor of the tele-photographic lens. Although it was found not to be an absolute novelty, its introduction as a practical photographic instrument was due to him. He also worked out a modified combination for small cameras, the "Adon," which about doubles the linear measurement of the image without any loss of rapidity or need for focussing. In passing away at so early an age as forty-seven, the optical and photographic world loses one from whom they seemed to have good reason to hope for much further service.

THE metric system is to be adopted at the works of Kynoch (Ltd.). Mr. Arthur Chamberlain, chairman of the company, has made a statement explaining that it is intended to carry out the whole of the clerical work, relating to interior economy, in metric units. The clerical work relating to customers will only be shown in metric units so far as these measures are already in use with their customers carrying on business in countries that have already adopted the metric system. We learn from the *Times* that Mr. Chamberlain says the change will neither be expensive nor difficult. Weights expressed in British units will be translated into kilograms, and the cost into decimals of a pound sterling. This will be done by simple reference to a card of equivalents. Thereafter in all its processes through the works an article will remain as so many kilograms at a decimal of a pound sterling per kilo. In this way the cost of every article will be traced through all its processes in metric units and decimals of an English pound, but the selling price so arrived at will be changed into English currency. The total cost of the introduction of the new methods of calculation is estimated at $\frac{1}{2}$ per cent. of a year's profits. The saving, on the other hand, on clerical labour will repay this in the first year. It will be seen that, so far from asking the clerks to learn anything fresh, they will only be invited to forget old troubles.

CARDIFF has given a lead to the rest of Wales by the establishment of a public observatory. Eleven years ago a suggestion was made in a local journal that a public telescope would be a most desirable acquisition. Following on this, Mr. Franklen Evans, J.P., a well-known local man of science, offered to the town his 12-inch reflector and sidereal clock, the offer being made through Mr. Arthur Mee, the then president of the Astronomical Society of Wales. Various difficulties stood in the way, and it was not until a couple of years ago that one of the councillors—Mr. J. A. Kidd—took the matter seriously in hand, and succeeded in rousing his colleagues to carry it through. In the meantime, the donor of the instrument had passed away. When, however, the council really moved, it made up for previous indifference. The telescope was put in thorough repair, and a suitable house built for it on Penylan Hill, which lies to the north-east of Cardiff, and is 250 feet above sea-level. In the final arrangements invaluable assistance was rendered by Mr. Albert Taylor, H.M.I.S., who resides at Cardiff, and has had great practical experience in the construction and use of telescopes. The observatory, which was formally opened by the Lord Mayor, is controlled by a committee of which Mr. Kidd is chairman, and consisting of city councillors and

members of the Astronomical Society of Wales. The telescope is clock-driven, and an attendant has been instructed in its manipulation and use. An illustrated descriptive pamphlet has been prepared by Mr. Mee, and large numbers of people are visiting the observatory and viewing the heavens through the telescope.

STAPHILINID beetles, chiefly American, form the subject of part vi. of vol. xvi. of the Transactions of the St. Louis Academy of Science. The author, Mr. T. L. Casey, takes occasion to mention that throughout the work he employs the term "America" as equivalent to the United States.

LONGICORN beetles from Selangor and Perak, described by Mr. C. J. Gahan, of the British Museum, and a continuation of Mr. H. C. Robinson's synopsis of the birds of the Malay Peninsula, constitute the zoological contents of No. 4 of the first volume of the Journal of the Federated Malay States Museums.

IN the Proceedings of the U.S. National Museum (No. 1428, vol. xxxi., pp. 575-612) Mr. W. M. Lyon describes a collection of mammals from the small islands of Banka, Mendanao, and Billiton, lying between Sumatra and Borneo. Although many are described as new, nearly all are closely allied to well-known species, and none is of special interest.

PARTS ii. and iii. of vol. xxxvi. of Gegenbaur's *Morphologisches Jahrbuch* are entirely devoted to the comparative anatomy of the Primates, Mr. G. Ruge dealing with the characteristics of the liver throughout the order, while Dr. H. Bluntschli discusses the femoral artery in the lower catarrhine monkeys. Both papers are of a highly technical character, and of interest chiefly to specialists.

WE have received a copy of an illustrated "Handbook to the Perthshire Natural History Museum and Brief Guide to the Animals, Plants, and Rocks of the County." The Perthshire Museum, as is well known, sets an admirable example to other institutions of the same nature in devoting its attention to the local natural history, and in issuing this "Guide" (at the price of 3d.) it will afford valuable assistance to local observers and collectors.

IN the December (1906) issue of the *American Naturalist* Prof. H. F. Osborn completes his elaborate survey of the causes which have been most conducive to the extinction of the larger mammals. As the result of this survey it is concluded that such extinction cannot be attributed to any one general cause. Indeed, the chief induction which can be drawn from the investigation is that when the numbers of a species have been seriously reduced from some chief or original cause, various other destructive causes come into action, thus producing a cumulative effect which may lead to complete extinction. In fact, from weakening its hold upon life at one point, an animal species becomes subject to attack at many other points.

To the January number of the *Naturalist* the Rev. O. P. Cambridge communicates a note on the power possessed by certain spiders of the family Salticidae of changing the colour of the large pair of eyes on the forehead. Some time ago Mr. W. W. Strickland, of Singapore, announced the occurrence of this phenomenon in two species of Attis spiders from Java, stating that he believed such a change to be unknown in any other creature. Mr. Cambridge points out that Mr. Strickland's observations were long ago anticipated, in the case of other species, by the late Mr. J. Blackwall. The same issue contains a

photograph of a basking-shark (*Selacho maxima*), measuring just short of 24 feet in length, taken in salmon-nets at Redcar in August last.

IN the *National Geographic Magazine* for December, 1906, Miss E. R. Scidmore graphically describes Kedda-operations in Siam, accompanying her notes with reproductions of a number of photographs of a herd of elephants being driven towards the enclosure, and of the same herd, or individual members thereof, in the coral. The Siamese Royal elephant hunt, which used to be an annual institution, is stated by the writer to be the largest affair of its kind in the world, but the steady increase of cultivation and civilisation in the country threatens the survival of the wild elephant. The hunt represented in the photographs was held after the King's return from Oxford and America, and resulted in the capture of 250 elephants. In Siam the tame elephant has apparently a much better time than its wild relative, the former looking sleek and well groomed, while the latter is gaunt and weather-worn, with projecting ribs and patches of fungoid growth on its hide.

WE have received the report of the Government bacteriologist of Natal, Mr. H. Watkins-Pitchford, for the year 1904-5. The greater part is occupied with experiments on, and results obtained by, the Rideal-Walker method of testing disinfectants. Experiments were also made on the use of sulphate of copper for purifying water, a strength of one part of the salt to 75,000 parts of water being recommended as being both valuable and safe. A nodular disease of the intestines of sheep, due to a small worm, is also described.

THE Bulletin of the Johns Hopkins Hospital for December, 1906 (xvii., No. 189), contains a second series of interesting reports on the comparative surgery of the lower animals, together with observations on distemper in dogs; from the latter it is concluded that the aetiological agent of this disease has not yet been definitely established. Dr. Knopf contributes an article on "Tuberculosis, a Social Disease," which contains many useful maxims for the suppression of the disease.

As the result of an examination of material, assigned to *Rhus glabra*, from many different parts of the United States, Mr. E. L. Greene, in a paper published in the Proceedings of the Washington Academy of Sciences, vol. viii., separates from the species twenty-eight segregates, of which five had previously been suggested as independent species. While there is good reason for splitting the species, the present affords a good instance in which the true value of the species would be best determined by cultivation, and not merely, as appears to have been the case, from a study of herbarium specimens.

WHEN engaged upon the inquiry into the devastations caused by bark-boring beetles among the "chilgoza" trees, Mr. E. P. Stebbing was able to acquire an amount of information about the forests of Zhob, Beluchistan, and the Takht-i-Suliman Range, in the North-West Frontier Province of India, that is embodied in the Indian Forest Bulletin, No. 7. The chilgoza, *Pinus Gerardiana*, highly valued for its edible seeds, forms in parts extensive forests of fine trees 70 feet to 85 feet high and 9 feet to 12 feet girth; in a few localities the blue pine, *Pinus excelsa*, is associated with it in appreciable quantity. Owing to indiscriminate collection of the cones, unrestricted grazing, and attacks of the boring beetles, it is shown that the forests, valuable alike for timber and their influence upon the water supply, require immediate conservation.

OF the scientific papers published in the report for 1906 of the Missouri Botanical Gardens, the most important contributed by Mr. G. G. Hedgcock deals with chromogenic fungi producing colour on wood. A large number of fungi were carefully cultivated through various stages, and it was found that the blue, grey or brown, and black colours produced respectively by the genera *Cerastomella*, *Graphium*, and *Hormodendron* were contained in the fungus filaments, and no stain was exuded; but in the case of *Penicillium* and *Fusarium* the pigments were exuded and taken up by the wood cells. A brief note by the same writer on zonation in fungus cultures, caused by alternations of day and night, relates to the results obtained under different monochromatic solutions. On the subject of abnormal plant developments, Mr. J. A. Harris describes saccate structures, "ascidia," formed by the fusion of two leaves, or the edges of one leaf in *Gasteria* and *Agave*, and proliferations of capsicum and passion-flower fruits, while Mr. H. Hus refers to fasciation in *Oxalis crenata*.

THE discovery of petroleum in the Gulf Coastal Plain of Texas and Louisiana has created a demand for specific knowledge of the geological relations of the oil. The demand was for the time met by the publication in 1903 of a United States Geological Survey report. The rapid development of the industry has necessitated a new examination of the fields, the results of which are given in a masterly memoir (Bulletin No. 282) by Mr. N. M. Fenneman. Detailed descriptions are given of topography, geology, and production of the Spindletop, Sour Lake, Batson, Saratoga, Matagorda, and minor oilfields, and useful information on the utilisation of the petroleum and on the methods and cost of well drilling is appended.

THE Geological Survey has prepared a very valuable memoir on the oil shales of the Lothians (Ordnance Survey Office, Southampton, price 4s.). The memoir covers 194 pages, with three plates and sixty-four illustrations in the text, and is divided into three parts. The first, by Mr. H. M. Cadell and Mr. J. S. Grant Wilson, treats of the geology of the oil-shale fields. The second part, by Mr. W. Caldwell, an experienced mining engineer, gives an account of the methods of working the oil shales. The third part, by Mr. D. R. Stewart, chemist to the Broxburn Oil Company, deals with the chemistry of the oil shales and the processes and products of manufacture. The whole report, which has been edited by Dr. Horne, forms the most complete monograph that has been written on the important oil-shale industry of Scotland. The first published description of the oil shales was a short paper contributed by Mr. Cadell to the British Association in 1885. More detailed accounts were contributed by him to the Iron and Steel Institute in 1888, and to the Institution of Mining Engineers in 1901. In the course of the recent revision of the Carboniferous areas of the Lothians by the Geological Survey, Mr. Wilson obtained much further information. Among the more important results are the determination of the outcrops and lines of fault owing to the recent mining developments in the Tarbrax, Cobbinshaw, Pumperston, and Breich fields, and the mapping of the new shale field at Ingliston. The recent discovery of valuable oil shale near Duddingston may have a vital bearing on the future development of the industry. The importance of the industry in Scotland is shown by the fact that in 1904 a total of 2,332,000 tons of oil shale was mined, yielding 62,932,000 gallons of crude oil, from which was produced 2,517,000 gallons of naphtha, 17,000,000 gallons of illuminating oil, 38,000 tons of gas oil, 39,500 tons of lubricating oil, 22,500

tons of wax, and 49,600 tons of sulphate of ammonia. The coloured geological map and the sections accompanying the memoir are excellent, but the illustrations in the text are crude and roughly reproduced.

IN the *Electrician* of January 11 is an interesting article by Mr. G. W. Pickard on the measurement of received energy at wireless stations, reprinted from the *Electrical Review* of New York, which should appeal to all who are watching the development of wireless telegraphy. The method described by the author is both simple and useful, and does not require an elaborate arrangement of instruments. A telephonic mode of reception is employed, and the sound of a single spark at the sending station is reproduced in the telephone by the discharge of a local condenser through the same receiving circuits, the charging potential of the condenser being made equal in intensity by variation until this is accomplished. The periodicity of the condenser discharge is the same as that of the received energy. Then knowing the potential and capacity of the condenser, the energy can be deduced by a simple formula. An objection to the method is the difficulty in comparing successive sounds, which cannot be accomplished with any degree of accuracy. Also a slight change of spark-length at the sending station would seriously affect results, and therefore make comparisons of the sending station's performance from day to day almost impossible. The author mentions a method by which this may be partly overcome by the insertion of a key in the detector circuit, so as to secure the sending of a truly single spark. At the same time, the method described will be useful as a rough test in practical work, and should help towards the solution of a true formula for long-distance work.

WE have received from Mr. T. A. Vaughton, Sutton Coldfield, a communication entitled "'Growing' Alumina," which gives particulars of phenomena observed during the passage of electric sparks between a globule of mercury, acting as anode, contained in a drawn-out capillary tube placed vertically a few millimetres above an aluminium plate, which serves as cathode. While sparks are passing, a circular "crater" composed of nearly pure alumina in a light, feathery form grows round the sparking spot, and after a short time the quantity of the product formed is considerable. In appearance it resembles moss; when examined with a lens during its formation, filaments are seen to shoot along the surface of the aluminium in definite directions. If the sparking be stopped and the deposit removed, the formation of the moss again occurs without the current being necessary, and the process may be repeated several times in succession. In an atmosphere of hydrogen no alumina is formed, and in oxygen but little growth occurs. The alumina produced acts on a photographic plate even through celluloid. A contributor to whom we have submitted the communication informs us that the phenomena are probably due to the formation of aluminium amalgam owing to mercury being sprayed upon the plate by the sparks. It is decomposed by atmospheric moisture, giving alumina and mercury, which is free to repeat the process. Little action occurs in oxygen because of the need of a supply of water vapour. The photographic action occurs owing to the production of hydrogen peroxide, which will attack a photographic plate through celluloid; hydrogen peroxide is generally formed in similar oxidations.

THE *Memoirs of the Liverpool School of Tropical Medicine*, twenty-one of which have been published, are to be superseded by a periodical which is to be issued by

the school under the title of *Annals of Tropical Medicine and Hygiene*. The annals will be edited by Prof. Ross, in collaboration with Drs. Stephens, Todd, Thomas and Breinl, Mr. Newstead, and Sir Rubert Boyce.

THE report on the scientific results of the voyage of the *S.Y. Scotia* is to be published in six quarto volumes by the Scottish Oceanographical Laboratory. The first volume will contain a narrative of the voyage and a summary of results, the second will deal with the physical results of the expedition, the third with botany, geology, and cartography, and vols. iv., v., and vi. with the numerous branches of zoology. The work will be fully illustrated with maps, plates, and photographs. Each volume will consist of several parts, which will be published separately when ready. Vol. ii. will be issued first, and will be ready immediately. It will consist of five parts, dealing respectively with meteorology, magnetism, bathymetry, physics of the ocean, and tides and waves. Orders, accompanied by a remittance for vol. ii., 42s., should be sent to the director, Scottish Oceanographical Laboratory, Surgeons' Hall, Edinburgh.

OUR ASTRONOMICAL COLUMN.

THE TEMPERATURE OF THE MOON.—In a paper appearing in the *Astrophysical Journal* (No. 5, vol. xxiv.), Mr. F. W. Very discusses Mr. Coblentz's recently-published conclusion that, from an investigation dealing with the reflection of heat radiations from various mineral substances, it may be deduced that the apparent temperature of the lunar surface is chiefly due to reflected solar radiations, and that the *actual* temperature may be about -225° C., in accordance with Langley's first conclusion. Mr. Very points out that his investigations of the radiations show that the larger part of them are not merely specularly reflected, but are radiated, the moon having first absorbed the heat from the solar radiations. Instead of -225° C., he suggests that the temperature of the lunar body may reach a maximum of about 100° C., the corrected lunar-radiation curve being similar to that appertaining to bodies not much below the temperature of boiling water.

THE HELIUM LINE, D_3 , IN THE SOLAR SPECTRUM.—In a communication to the *Observatory* (No. 379) Mr. Buss, of Ashton-on-Mersey, states that he has repeatedly seen the helium line, D_3 , as a dark line, when examining parts of the solar disc, within the sun-spot zone, on which there were no telescopic signs of unusual activity. He has previously recorded the appearance of this line in the region of various spots, but never in the spot umbra itself, and thinks that it might be found very often if continuous observations were made for the purpose. He also suggests the possibility of D_3 being a regular feature of the Fraunhofer spectrum, the line being too fine to be seen with our present instruments, except on occasions when the region examined is subject to some slight disturbance.

A WHITE SPOT ON JUPITER'S THIRD SATELLITE.—In No. 4147 of the *Astronomische Nachrichten*, Senor José Comas Solá, director of the Fabra Observatory, records the observation of a white spot near the north pole of Jupiter's third satellite on November 23, 1906. The observation was made with powers of 450 and 750 on an equatorial of 38 cm. aperture, and with the latter magnification the spot was seen, with great facility, as being intensely white and bordered by a very dark area; Senor Solá thinks that much smaller instruments may reveal this feature. With a steady image other, dark, spots were seen, the whole disc of the satellite appearing as a reduced image of Mars. The observation was made between 13h. and 14h. 15m., but no displacement of the spot was detected.

A REMARKABLE NEBULA.—On some plates taken during September, 1906, Prof. Max Wolf has found an extended nebula near to the star 26 Ceti. Practically all extended nebulosities are situated in or near to the Milky Way, but this is a remarkable exception, for it is removed some